# N.A.C.A. BULLETIN

In Two Sections

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## EDITORIAL DEPARTMENT NOTE

The case for widespread adoption of the natural business year for industrial and commercial establishments is made again, in a convincing manner, in our first presentation, which emphasizes the represented advantages from management's viewpoint. These include more reliable and more readily prepared financial statements and improved planning consequent on alignment of the fiscal year with the operating cycle of the enterprise.

The article is the work of SAMUEL TEPPER, Accountant with the New York City Housing Authority. Mr. Tepper is a graduate of the College of the City of New York and has received the degree of Master of Business Administration from New York University.

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The uneasy state of the world, together with related national actions taken or contemplated, have provided an earlier use for the experience gained in the years 1941 to 1945 than either Government or industry could wish. If renegotiation of rearmament contracts, recently provided for as part of procurement legislation, is to play a necessary part in this situation, it is certainly well to apply all that was learned in the war years to make sure that the minimum load is placed on the nation's productive capacity. Our second article makes a novel proposal in this direction.

The plan is offered by CHARLES H. LANPHIER and CECIL L. CLARK, Vice-President and Treasurer, respectively, of Sangamo Electric Co., Springfield, Ill. Mr. Lanphier is a graduate, in the field of physics, from Yale University. Mr. Clark, who was the first President of Sangamon Valley Chapter and is a previous contributor to the *Bulletin*, is a C.P.A. in Illinois and a graduate in accounting from the University of Illinois.

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When automobile or automobile parts production is mentioned, the picture of an industry subject to sudden changes in volume, specifications, and design is at once brought to mind. This is especially true of the extremely competitive portion of the field devoted to parts and parts assembly production for other manufacturers. Consequently, production control and related procedures must be built on a highly flexible basis and so become of considerable general interest. An instance of such procedures is set forth in our third article.

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Many industrial processes cut across product lines and are found in many industries. Plating is one such process and it is also one of a group of operations which, because of its automatic or semi-automatic character and the variety of individual items subject to it, sometimes seems to defy a "per piece" labor cost determination. How this determination is reached in one case for the development of standards for labor cost control is described in our final article.

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SEPTEMBER 1, 1948

# ADVANTAGES OF THE NATURAL BUSINESS YEAR TO MANAGEMENT

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THE general acceptance of the year as the accounting period does not necessarily involve acceptance of the *calendar* year. The latter came into being as a uniform measurement of time and there is no reason to associate it with the accounting period except insofar as each includes twelve consecutive months. There is no purposeful connection between the calendar year and any economic law or cycle of events except seedtime and harvest in temperate zones, and it is illogical to adopt it as the accounting period unless it happens to coincide with the natural business year. The natural business year of an enterprise has been defined as "the period of twelve consecutive months which ends when the business activities of the enterprise have reached the lowest point in their annual cycle." Otherwise stated, it is the period of twelve months which ends with the close of the natural operating season of a business, when inventories, receivables, and liabilities are reduced to their annual minimum.

### *Natural Cycle of Operations*

Business organizations whose industrial activity is characterized by a natural cycle of operations which begins, gains momentum, and winds up at relatively the same period each year should give serious consideration to the practicability of coordinating the accounting records and reporting periods with this cycle. Nature has so arranged our way of life as to cause the need for specific commodities to arise at various times during the year, but each repeating itself at the same relative period in succeeding years. The manufacturer who hopes to provide us with a certain commodity must so plan his production and distribution schedule as to permit him to have it available in sufficient quantity at the time of our need for it.

In arranging this schedule the industrialist has done so with complete disregard for the calendar year. He has found from experience that there is a seasonal fluctuation causing an increase and decrease in the volume of operations at approximately the same

date each year. At a certain time each year, his sales begin to mount, reach a peak, and then gradually subside. All of his production activities—gathering raw materials, recruiting the required labor, carrying out the manufacturing process, and finally distributing the finished article—are geared to meet the demand for his product at the appropriate time.

The industrialist operates his plant on a natural business year basis. He would consider it wasteful and inefficient to set up his production schedule on any basis not consistent with the timing of consumer demand. It may well be to his advantage to employ similar reasoning in setting up the financial records which are intended to reflect the results of these operations. When these records are so arranged as to include a period inconsistent with the production schedule, the annual summaries of operations may present a warped picture which can be normalized only through adjustments. It has been estimated that not more than ten or fifteen per cent of industrial concerns have a natural fiscal year closing on December 31. In spite of this, most business organizations use a fiscal year coinciding with the calendar year.

The desirability of adopting the natural fiscal year as the accounting period was recognized as far back as 1839. In that year one Isaac Preston Cory wrote, as quoted in an editorial in *The Journal of Accountancy* for March, 1937:

> "It is customary with every merchant once or twice a year to make what is called a rest when he balances his books and examines all his stock on hand in order to ascertain the amount of this stock and the profits and losses of his business. To this operation he usually devotes *that time of the year when business is most flat, and when most of the personal accounts are made up* and the real accounts exhausted by the sale of *the articles in which he deals.*" (Italics supplied)

### *Making Financial Statements More Reliable*

The business man who disregards the opportunity to close his books during the lull following the close of his production and selling seasons may be doing himself something of an injury in terms of reduced operating and administrative efficiency and at the same time creating serious but avoidable problems for his accounting staff. This paper is devoted to a presentation of the internal advantages of operating under the natural fiscal year for the par-

ticular enterprise, but it may also be noted quickly that any move which renders financial and operating statements easier to obtain and more reliable will quickly produce supplementary benefits for the company in terms of better relationship with all groups who use such statements. These are numerous and important today and include, not only the Government, stockholders, creditors, and security exchanges, but also the interested portion of the public—and the public always includes present or potential customers.

However, if management alone, with its responsibilities, is considered, it remains of paramount importance that annual financial statements should, as nearly as practicable, represent "making port" (although the successful enterprise, the "going" concern, never does), that they should be as accurate and complete as the ability and judgment of those charged with their preparation permit. Preparation of statements amid maximum or even moderate flow of transactions will hamper exercise of such skill and judgment, which at best cannot insure absolute accuracy of the reports. All periodical statements must include a number of factors which cannot be stated in dollar amounts except through a degree—often material—of estimate and judgment. This is caused by the existence of open transactions at the beginning and at the end of each accounting period (among which are uncollected sales, unprocessed or unsold inventories, unexhausted plant facilities), the results of which will be known only in a later period.

It would seem most advisable, therefore, that the executives of the organization strive toward financial statements which will reflect as few uncompleted transactions as possible in order to depend that much less on estimates of the effect of their completion. It is logical that the fewer the number of estimates required in preparing the reports the more accurate will the reports be. A corporation which endeavors to prepare its statements when there are the fewest number of open transactions can reduce the margin of error in the statements and the volume of work involved in their preparation.

The normal cycle of operations usually consists in building up of inventories, the conversion of these into receivables, the realization of the latter in cash, and the liquidation of the liabilities incurred in carrying out the first two steps. Financial statements prepared at the time of year at which the normal cycle of operations has closed for the greatest volume of transactions, instead of at the end of the calendar year, are more valuable to the firm's

management in that they then reflect the results of completed seasonal activities. With the completion of purchasing, manufacturing, selling, and collection activities of the season, a pause will ensue which marks the close of the natural fiscal year. The balance sheet and income statement prepared at this time will more clearly demonstrate the results of the full season just passed. It resembles, if not the end of the voyage, at least a port of call at which the vessel is substantially lightened of its cargo.

*Accounts Receivable*

The accounts receivable and the inventory are among the most important items on the balance sheet of an industrial corporation. The end of the natural fiscal year will find the selling period past and the collection period nearly over. This will be the time when the receivables will be at their annual minimum, both as to amount due and the number of accounts. This is the logical time to review the open accounts and determine their collectibility and establish their worth. At such time, when the balance of the accounts receivable will embrace fewer accounts, a more accurate reserve for uncollectible accounts will be possible, and the charge-off for worthless accounts can be more readily ascertained. Likewise, when the number and volume of uncollected accounts is lowest, the estimate of returns, allowances, and discounts applicable to the period and eventually to be recognized, can be made with least margin for error. The volume of January returns on Christmas sales was one of the factors which brought about general adoption of January 31 as the annual closing date in the retail field.

*Inventories*

Of equal or greater importance in company statements and much less easily determinable in order to effect the annual closing of the books is the amount and valuation of the inventory. It is vitally important for both the balance sheet and income statement—and those who use these statements—that the inventory be arrived at as reliably as is possible. An inventory taken at the most advantageous time will express, in the dollar amount shown, a substantial element of judgment as to valuation basis, quality, obsolescence, and even quantities. The larger the inventory the more material will be the factors depending on judgment.

The conversion of raw materials to finished articles during the production period and the subsequent disposition of these through

the selling period will normally result in a low inventory at the end of the natural business year. The difficult task of measuring the value of goods in process may be almost completely, or even wholly, avoided, and the taking and valuation of the comparatively low stock of finished goods will insure greater accuracy in quantities and valuation. Experience has demonstrated that even with respect to the more routine aspects, the margin of error in determination of the inventory is substantially decreased when the quantities on hand are reduced. This is due to the proportionately lessened amount of tallying, pricing, and extending necessary in arriving at the final inventory figure.

In addition to the reduced amount of inventory, the greater amount of time available for inventory taking permits more careful determination of slow-moving, unprofitable, obsolete, or surplus stocks of merchandise or materials on hand and their proper evaluation at prices reflecting likely ultimate disposal.

The taking of the inventory in many businesses is an expensive operation and sometimes results in closing down plants while the inventory is being weighed, counted, or measured. To have such a stoppage of operations during a busy season is an avoidable waste. When the inventories are at their lowest point, and the operations of the business also reduced, the taking of the inventory is a less expensive operation, and does not interfere with the normal productive activities of the business. In most cases, inventory taking time should come when a manufacturing concern slows down or shuts down for periodic repairs, retooling, and general preparation for handling the increased cost of orders at the rush season. This period necessarily comes at the end of the natural cycle of operations.

It is also worth while to mention at this point that with the reduced production and administrative activities certain members of the staff are relieved of the pressure of their normal duties and are available for assisting in taking, pricing, and computing the inventory. This avoids expense of engaging additional outside assistants, unfamiliar with the company's products and less efficient than the regular employees.

It is true that an increasing number of business organizations are turning to perpetual inventories as a method of quantity control and also (usually with interim serial counts) as a substitute for an annual physical inventory. However, the adoption of this method of inventory merely operates to emphasize the significance

of the natural business year concept. Introduction of a perpetual inventory system presupposes that an annual physical count to verify the book balances or any comprehensive supplement to serial counts, will be made when the stocks are at their annual minimum, normally at the end of the organization's cycle of operations. According to Robert H. Montgomery, writing in the *N. A. C. A. Bulletin* for November 15, 1936, "No perpetual inventory method has yet been devised which obviates the necessity for periodic verification by physical count."

*Comparisons*

The objectives sought in the preparation of annual comparative statements and other statistical data will not be realized in full, and may actually be misleading, if the statements are based upon periods other than the natural business year. Closing the books at an arbitrary date confuses the significance of statistical studies in many industries, owing to the inclusion of parts of two different seasons in the results. It is unrealistic to expect to draw valid conclusions from the comparison of statements embracing fractional parts of two consecutive operating seasons. When an automobile manufacturer, for example, issues statements as at December 31, they will combine the results of three fourths of one operating cycle with one fourth of the succeeding cycle. A portion of the sales of one year's model and the expense of producing and distributing it, will be added to the sales and expenses of the next year's model.

If, however, the fiscal year coincides with the natural business year, the results of the two years may be more reliably compared as the effect of different wage contracts, different sales contracts, and different policies of management in a way which can be of great value to the executives.

Not only is the comparison from one year to another of the operations of an individual company of greater value on a natural year basis, but the significance is of equal importance in comparisons among companies in different lines. Comparison on a calendar year basis may at first glance appear more advantageous because the period covered would be identical for the firms being compared. However, one company may just be entering its heaviest selling season, another be at the peak, and a third in the slack period representing the close of the season.

Statements of varying types of concerns prepared at various

dates, but each at the close of a natural period, afford more intelligent comparison and would be of greater value than statements prepared as of a single arbitrary date. The operating success of the companies as well as their financial position can be compared at the same stage, namely the end of the operating season.

*Policy Making*

The end of the natural business year is the time to review the last twelve months in perspective. This is the time for new planning, adjusting to new conditions, and considering the most advantageous steps to be taken in preparation for subsequent periods. Good management requires the formulation at least annually of policies and programs through which the practices of the ensuing year are to be directed. During a season of peak production or sales, it is virtually impossible for the busy executive to give thoughtful consideration to matters of policy affecting the coming season. The logical time to approach these considerations is just after the close of the business cycle.

The period between operating seasons provides the vantage point from which the clearest picture of the operations of a season of the business can be obtained. This is the time to consider negotiation of sales and wage contracts, credit needs of the future, designs and plans for new models, and generally to consider the position of the organization with respect to over-all economic prospects. The experiences of the past fiscal year have an important bearing upon the determination of plans and policies to be followed during the next fiscal year. Financial statements, budgets, audit reports, and production schedules, based upon a complete cycle of operations, present statistical results which upon careful study are of maximum value to management. This is true both for future planning and as an analysis of the effectiveness of the previous year's sales and operating programs.

*Credit Needs*

If a business executive takes advantage of the opportunity presented at the end of the natural business year to review his past operations and plans for the future, he will be in a better position to estimate the bank credit which will be required during the succeeding twelve months. Furthermore, at the end of the producing and selling seasons, the liabilities which have been incurred to provide material and labor will have been reduced to the lowest

point by the cash received from the sale of the finished products.

It is plain that the time to present an annual statement to a credit source is to some extent determined by the appearance of the statement itself. When will the statement show the firm in its most favorable position for credit purposes? Obviously when it can reflect greatest liquidity and the most attractive current ratio. This can be accomplished only if the statement is prepared at the close of the natural fiscal period. For it is at this point that the liquidation of the inventory and receivables approaches fact, rather than conjecture. It is at this time that the cash balance is high, and current liabilities reduced to a minimum.

*Budgeting*

One of the primary purposes of budgetary control is to coordinate the activities of various functional departments. The planning, financing, and sales activities which are interrelated for a specific season will probably occur in different months. However, it is easier to maintain efficient budgetary control if each of these activities, as they relate to the products of a particular year, falls within the same budget year. In an industry where planning and production take place in the fall and winter in preparation for spring sales, a budget period ending December 31 results in production plans in a period different from that of the sales with which they should be coordinated. One of the aims of the budget is therefore limited in that cooperation among the departments in attaining the results fixed by the budget is hampered.

A company which operates within an accounting period consistent with its natural business year has its highest sales period in the latter portion of its fiscal year. This assures that the production of the goods and their sales will fall, to the maximum extent possible, in the same fiscal period. When the heaviest sales period falls in the early part of the fiscal year, the company is hampered in depending upon the budget for guidance in production planning because the manufacturing season falls in a budget period preceding that in which the goods are sold.

*Improved Audit Service*

It is uneconomical from the company point of view for the outside auditor to require books and records needed at the same time by the accounting staff to reflect the regular operations of a busy manufacturing or selling season. It is similarly uneconomical for

the firm executives to lay aside their primary duties of supervising certain functions, when they may be at their annual high point, in order to enter into discussions with the auditor respecting the latter's findings or to give attention to discussions of broad fiscal problems of the business, which at other times might prove beneficial to all concerned.

*Personnel*

A business concern adopting the natural fiscal year will find itself making more efficient use of its staff and at the same time in a position to provide its personnel with benefits not quite as practicable under a calendar or other arbitrary fiscal period.

The time to do the additional details called for by the closing program is when the seasonal rush of the business is over. When the selling and production peaks have passed, the employees have time for the closing work. During such peaks, they can apply themselves without interference to the regular business of the company. Such interference can be quite costly. In addition to the inescapable necessity of hiring at least some additional help, the organization may find it necessary to temporarily assign employees from other departments to the accounting department to assist in closing operations.

No discredit can be leveled against these employees if, being unfamiliar with the accounting department procedures, the schedules and statements are delayed and possibly of questionable accuracy. The result is that the statistics required by the executives to conduct the business intelligently are in turn delayed. Furthermore, during the active periods of the business, the administrators may be too busy to read with adequate attention the information contained in the company's annual statements and supplementary reports. One of the primary purposes, then, of the annual statements is unfulfilled.

*Determination of the Natural Period*

What steps should a corporation take in order to determine its natural business year? Although the company executives have a fairly accurate idea of the annual seasonal trends as a result of their previous experience, a careful study of the business activities should be made on a statistical basis. A study of the tendency of monthly sales and production figures for the past five years should be made. Inventories, receivables, and payables should similarly

be analyzed on a monthly basis for previous years. The results should be reviewed by one or more individuals familiar with the recent history of the firm and the industry. It should become apparent what time of the year a natural break between old and new seasons occurs. This will be the most favorable time for an accurate determination of the preceding year's results and the status of the business.

In most manufacturing and mercantile organizations, the inactive period will be characterized by depleted raw materials and finished goods inventories, especially in those trades or industries where change of style is a factor. However, if the period of lowest inventory should for some reason not regularly coincide with the firm's slack season, the physical inventory should be taken annually when it is at its low point and the fiscal year should be closed during the inactive period. A perpetual inventory system should be installed and the book inventory figure used in compiling the statements at the close of the fiscal year.

In the preparation of the foregoing article, the author has, to some extent, written against a background of ideas expressed by earlier authors. He wishes to acknowledge such help from the following sources:

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# A PRACTICAL ALTERNATIVE TO RENEGOTIATION

by CHARLES H. LANPHIER, Vice President, and
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A FEDERAL renegotiation statute is again on the books. The Renegotiation Act of 1948 (as a part of the Supplemental National Defense Appropriation Act) was signed by President Truman on May 21, 1948 as Public Law No. 547. It is reasonable to assume that subsequent appropriation acts in the direction of rearmament will also contain renegotiation provisions.

### *The Problem*

How much or how little this means no one now knows. It has been suggested that rearmament procurement negotiations will be so conducted as to minimize the necessity for invoking renegotiation powers. This may or may not prove possible. A great deal depends on how much government contracting becomes necessary and only events will make that known. In any case, renegotiation regulations are being framed by the authorities and now is the time to apply any past experience which will make future renegotiation, or any substitute procedure, a less painful process for both the government and industry. There is proposed in this article an administrative procedure which it is believed will satisfy industry in general and will afford ample protection to the government. If any features of the proposal are regarded as going beyond administrative discretion, it is believed that necessary legislation would be justified.

Inevitably as a result of present legislation, government agencies will be confronted with the problem of procuring military material from reliable industrial firms engaged in the manufacture of commercial products at peak capacity and at satisfactory profit margins free from the burdens of renegotiation. Although these concerns recognize their obligations to their government and must be willing to divert some capacity for the manufacture of military apparatus or components, they will assume this responsibility with reluctance and apprehension because of experience during World War II with the administration of the Renegotiation Act passed in 1942 as part of the Sixth Supplemental National Defense Appropriation Act of that year, and because of all the associated problems of cost

analysis, overhead allocations, price redetermination, arbitrary profit allowances, etc. It is obvious that these problems will be more involved when twenty per cent of productive output is for military apparatus than during the war when ninety to one hundred per cent of productive capacity was, more often than not, devoted to contracts or subcontracts subject to renegotiation. It is recognized that it is in the public interest for the Government to establish protective measures, such as renegotiation, against the realization of excessive profits on government contracts. It is equally in the public interest that the Government avoid the creation of an administrative procedure, impractical and costly in itself, which does not provide an incentive to contractors to produce at low cost.

*The Proposal in Brief*

The proposed procedure may be rather simply stated. It involves repaying to the Government, through the Collector of Internal Revenue, a refund computed as follows:

1. The taxpayer will compute the percentage of net taxable income (excluding capital gains and losses, casualty losses, and income from investments) to total net sales (renegotiable and nonrenegotiable).
2. If the percentage obtained in (1) is in excess of ten per cent, the taxpayer shall refund an amount equal to this percentage excess applied to net renegotiable sales.
3. If the percentage obtained in (1) is less than ten per cent, no refund will be required from the taxpayer. It is suggested that, in the case of manufacturing agents, the limiting rate be five per cent instead of ten per cent.

The lead to this proposed procedure is afforded by the new Renegotiation Act, itself. Section (c) provides that:

> "In the interest of economy and the avoidance of duplication of inspection and audit, the services of the Bureau of Internal Revenue shall, upon request of the Secretary of Defense and with the approval of the Secretary of the Treasury, be made available to the extent determined by the Secretary of the Treasury for the purpose of making examinations and audits under this section."

As a means of verifying the amount of renegotiable sales reported by the taxpayer, it would be necessary that the Bureau be

furnished with information returns from all procurement agencies and prime and subcontractors making purchases of material subject to the Renegotiation Act of 1948. These information returns would be filed perhaps by February 28th of each year and would show the amount of purchases subject to renegotiation made from prime and subcontractors during the preceding calendar year. A copy of the information return would be furnished to the prime and subcontractors from which the purchases were made. This information would be used to check a report of sales which would be filed by all prime and subcontractors with their annual income tax return. This report would show (1) name and amount applicable to net sales subject to renegotiation made to each purchaser and (2) the amount of commission paid to each agent on sales subject to renegotiation.

*What About Contract Losses Covered by Commercial Profits?*

The proposal is so clear-cut and ready of application that its very simplicity may needlessly encourage doubts as to its practicability. It may be worth while, therefore, to consider possible objections to the procedure before elaborating on the benefits which would flow to both the government and industry from its application. It may be said that a company might lose money on government business and yet pay a refund of supposed profit because of extreme good fortune with its commercial orders. This is perhaps the most serious objection which can be raised by industry. It is common experience in industry to suffer losses on some orders, offset by greater profit on others, but it would be rather a blow to increase such losses by additional payments made on the assumption that profits had been realized.

To allow for this, it is probable that the contractor should have the alternative of foregoing the convenience of this proposal and instead subjecting himself to the wear and tear of: (1) filing a statement of direct and indirect costs allocated to renegotiable sales, (2) filing a statement of the method used to allocate costs between renegotiable and nonrenegotiable sales, and (3) paying over to the Government profit in excess of a smaller percentage, such as eight per cent. This data should be subject to audit over the same period of time as the representations on the tax return proper. It would not appear, however, that there would be many instances in which the contractor would elect this option in prefer-

ence to the principal procedure here advocated. The problems of cost allocation are too complex and too full of pitfalls in interpretation to render the optional method strongly attractive and its application would inevitably be confined to hardship cases.

*Other Objections to the Proposal*

Renegotiation has been looked on by some as simple correction of original high contract prices. Under the proposed procedure, it would not operate exactly in that fashion. However, the question may be asked whether it does (or did) in its conventional form. Renegotiation is no protection against excessive prices because renegotiation is essentially cost-plus, and there is no incentive to reduce costs—only temptation to increase them. Under the present proposal, the procurement officer will be greatly assisted in obtaining reasonable prices by means of probable competition of industry for government contracts because of the removal of undesirable features of doing business with the Government.

Industrial management has, at all times, the responsibility of making the highest possible profit for the owners of the business. If the objectionable feature of profit recapture on a cost allocation basis be removed, government business will become attractive business. In peacetime, industry will compete for it in order to obtain that incremental volume which is always highly profitable. As a result, the Government will not only obtain the benefit of competitive prices, but in addition will, under the proposed formula, share on a proportional basis in the incremental profit.

Alert and farsighted management should be interested in free and unrestricted government business for another reason. One cannot afford to overlook the possibility of another national emergency. Companies must be prepared in such event to make complete conversion of their facilities as quickly as possible to the manufacture of military products. Management is urgently aware that, in order to have something to manufacture in the event of war, experience must be gained in peacetime. These conditions offer a strong incentive to make quotations on government contracts on a competitive basis.

Some may ask what is to stop a corporation from forming a subsidiary sales corporation to purchase standard commercial products from the parent company at a low price and sell these products to the regular trade at the established prices? By this device a substantial portion of the profit would be transferred to

the subsidiary company leaving the parent company with an aggregate profit below ten per cent on combined military and commercial business, thus avoiding any refund. Of course, there are always some firms who will try to "chisel." This loophole could be plugged by regulation or legislation under which the Secretary of Defense would reserve the authority to consider the operations of the parent company and subsidiaries on a consolidated basis for purposes of recapturing excess profits on government contracts. For this purpose it might be necessary to require the contractor to make a report of intercompany sales and purchases.

Admittedly, it can also be argued that the proposal might subsidize industry through the device of averaging net profits on the basis of aggregate sales. It is questioned whether or not such an argument is important. If a contractor is responsible and is the only contractor with the required "know-how" and technical skill to produce the military apparatus for the government, perhaps he should be subsidized for that purpose. The Government necessarily has subsidized, in effect if not in fact, certain industries in the past, but as long as any concern's aggregate profit margin is not excessive, there is no cause for public criticism.

### *Major Advantages*

If the objections which have been considered are, as we feel, the principal ones, the proposal merits serious consideration for its positive virtues. Each of the three following advantages clearly indicates a load which can be removed from the shoulders of both government and business. The proposed procedure:

1. Offers an incentive to the contractor to produce at low cost.
2. Eliminates the necessity of the allocation of costs between government business and standard commercial business.
3. Provides for economy of administration.

### *Incentive to Produce at Low Cost*

It has been generally recognized by both the government and industry that the various methods utilized to eliminate or recapture excess profits during World Wars I and II did not offer any incentive to contractors to reduce cost. On the contrary, reduction of costs was discouraged under the practice of renegotiating profits

"after the fact," with profit percentages varying according to the opinion of the individuals participating in each renegotiation. As a practical matter, under the Renegotiation Act of 1942, profit allowances were renegotiated on the basis of aggregate costs. Such procedure had all the inherent evils of the cost-plus-a-percentage-of-cost type of contract supposedly prohibited by law. The Government negotiators were instructed to investigate the reasonableness of cost, but, in most cases, there was no yardstick of comparison to determine whether the contractor was a high or low cost producer. As a result, profit allowances were established on cost.

The subject proposal does offer incentive to reduce costs because the contractor will be able to retain a portion of the profit resulting from such reduction in cost. For example, assume that a contractor's sales of standard commercial products are $15,000,000 and sales of military apparatus are $3,000,000, making a total of $18,000,000. Also assume that the taxable income on such sales as determined to the point required by the formula is $2,700,000 or fifteen per cent of total gross sales. The sum of $150,000 would be refunded. The incentive results from the fact that, if the contractor actually had made eighteen per cent, or $540,000, on the government business (although the proposed procedure avoids the difficulties involved in determining this "net" by cost allocation), he would be permitted to retain $390,000 or thirteen per cent. The Government will be protected against excessive incentive earnings, in case the contract price is unreasonably high, because the resulting profits will be reflected in the aggregate taxable income and the Government will recover on a proportional basis.

In addition, it should not be forgotten that procurement officers can avoid unreasonable contract prices as an essential step in the control of profits. They have in the past and must in the future continue to negotiate contracts at the lowest possible price to the Government. It is *not* proposed that the suggested plan relieve the procurement officer of his responsibility to negotiate a fixed price contract at a reasonable price. Although the example used above is for a contractor who has a small percentage of government business, as compared to his commercial business, it is believed that the plan can be applied to all industries and companies producing special military apparatus. Standard commercial items which can be procured through competitive bidding should continue to be obtained in this way.

*Elimination of Allocation of Costs*

Perhaps, however, the greatest relief under the proposal would be afforded by the elimination of the necessity of allocating costs between government business and commercial business. The determination of the amount of direct labor and direct material utilized on government contracts can be obtained with reasonable accuracy. The allocation of overhead between government business and commercial business by a concern primarily engaged in the manufacture of its regular products, is a different matter and becomes an insoluble problem. Experience during World War II has proven that, in a number of cases, there is a wide difference of opinion between government accountants and industrial accountants (not in theory but in practice) on the items of overhead which should be included in the cost of doing business with the Government.

The industrial accountant is at a definite disadvantage in making his points because he is aware of the intangible cost which should be charged to government contracts but which cannot be supported by figures. Consider a manufacturing concern with eighty per cent commercial business and twenty per cent government business. Such a concern's cost accounting and production system is geared to the production of commercial products. Special procedures and controls have to be established to produce a contract for military apparatus. All the paper work in connection with accounting and production requires special handling resulting in factory and administrative overhead cost considerably higher than the same volume of commercial sales.

Special handling is also required in the factory. The quantity of parts required for military apparatus is oftentimes small, requiring a disproportionate amount of machine setup time by skilled machinists. As a rule, experienced operators must be chosen to run the special parts generally requiring closer tolerances. This means that the less experienced operators are transferred or hired to make standard commercial parts. As a result, the commercial parts are produced at a higher cost due to a higher percentage of rejections and junkage upon inspection. These hidden costs cannot be supported by figures and are therefore not allowable by the government auditor.

It is believed that these hidden costs of administration will offset the cost of selling and advertising which will be reflected in aggre-

gate costs on the tax return but which the Government contends are not costs of doing business with the Government. These points, which relate to the virtual impossibility of making proper cost allocations, also further support the position that averaging profits on the basis of sales would not be an unfair method of determining allowable profits.

*Administrative Economies of the Proposed Plan*

Under the proposal, the burden of return to the Government of excessive profits on renegotiable business falls on the contractor. The amount of the refund will be computed by him and remitted to the Treasury Department. The proposed method of submitting information returns will provide the Treasury Department with a means of checking the amount of government business reported by the taxpayer. The administrative economies in the cost of operating a plan of this kind, as compared to the cost of administering the Renegotiation Act of 1942, are readily apparent. Complicated and costly bookkeeping by contractors is completely eliminated, as is also the maintenance by the government of a separate, large staff of renegotiators, auditors, and examiners.

*Summary*

In conclusion, it may be said that the proposal establishes in advance a uniform percentage basis of determining allowable profit, applicable to all contractors in the same way, to replace arbitrary profit allowances "after the fact" determined by the personal opinion of negotiators. It likewise offers contractors an incentive to produce at low cost through the assurance that a portion of the saving in cost can be retained. The former opportunity and temptation to increase profits by increasing cost is removed. The plan also effects complete elimination of the time consuming and costly task of cost allocation, much of which is not susceptible of a mutually satisfactory solution.

In making this proposal for profit limitation under the Renegotiation Act of 1948 an attempt has been made to shape a plan which will correct shortcomings of World War II renegotiation and yet will be equitable and result in fair prices to the government, as well as reasonable profits to industry. It is recognized that there is no perfect solution for either government or industry; this plan is recommended as a closer approach to a solution because of the important advantages it offers over World War II renegotiation.

# PRODUCTION PLANNING FOR AN AUTOMOBILE ACCESSORIES MANUFACTURER

by J. W. SCHAFER,
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OUR company produces parts and assemblies for the automotive industry. We must expect quick shifts in volume and specifications in accordance with the progress and fortunes of companies in that industry. We must do a little informed guessing, too, if we are to keep production at all steady and our costs within reason. Consequently, the production control department occupies a key spot in our setup so that regular orders, expediting, cancellations, modifications, etc., may receive the flexible handling which alone will satisfy conditions reflected in operations.

### *Responsibilities of the Production Control Department*

This article is devoted largely to the production planning functions which such a situation implies but production control is also charged with related physical functions and mention of these may be in order. They include responsibility for:

1. Receiving all materials.
2. Supplying machining and assembly departments with materials required.
3. Handling all movement of materials between departments.
4. Handling finished material, storing or preparing for shipment, and shipping to the customer.

These functions satisfy the physical requirements of handling productive material. The planning (and related) functions are listed as follows:

1. Analyze customers' orders and acknowledge shipping requests.
2. Authorize the purchase of sufficient material to cover manufacturing requirements.
3. Schedule to the production departments the various parts to satisfy the manufacturing schedules.
4. Satisfy customers by meeting shipping promises through close follow-up between shop and production control.

Physical control of materials is the responsibility of the receiving and shipping department as a section of the production control department. The planning functions, conducted by the two remaining sections, the material section and the scheduling and follow-up section, are the subject of this paper.

*Routing of Customers' Orders to Production Control Department*

The products we sell our customers fall into two classifications: production parts or assemblies and service parts. Production parts are those which our customers ordinarily use in manufacturing current models. Service parts are those which are used by our customers for repairs on present and past models in the hands of the public. In the case of production parts orders, the sales department passes on to the production control department the actual customer purchase orders, either firm orders which show the actual quantity (and delivery required) or blanket orders which reflect the terms of sale but do not set forth any quantities or delivery dates. The latter type is supplemented by shipping releases issued periodically by the customer, giving instructions as to quantity and dates shipment is wanted.

Purchase orders received by the sales department on service products are handled differently. A sales order is made up by the sales department for each service part ordered. This form is prepared in sets of five copies which are sent to the production control department where the date the customer wants the product is reviewed and (taking into consideration the availability of material and manufacturing capacity) a shipping promise is entered on all copies. The copies are then distributed as acknowledgment to the customer, standards department copy, sales department copy, and finished stock warehouse copy. Production control retains the remaining copy as a follow-up medium.

When a purchase order, release, or sales order as described, is turned over to production control, the material section prepares to authorize the purchase of the necessary raw, partly fabricated, and finished material, for the product. This action is generally started when the applicable document is received from the sales department. However, this is not always the case since, in some instances, we proceed to buy material on the strength of a release letter, which is generally issued by the sales department and is an internal authorization sometimes used to get material on order in a hurry so that production can be started as soon as possible.

*Timing Customer Requirements in Terms of Production*

So many of our customers use the blanket order and shipping release system referred to (with various quantities released against the same order), sending us, on the average of once a month, a new shipping release which shows what they have received and what they desire shipped in the future, that this type of order will be somewhat assumed in discussing our production control procedure. From these releases we enter data on a form known as the Forecast Card. This card is a very important record, inasmuch as we base our estimates of needs for material and our shop schedules on it. There is one of these cards for every product. The card bears a list of the customers who buy the product and shows what quantities each customer is going to take and in what month he wants them according to the latest releases sent us. The totals at the bottom of the card represents the total quantities to be shipped, by months, to all customers using the product.

Below these projected delivery totals, the card has one more line which is used for the "Internal Production Plan," and on it are shown the quantities to be manufactured in each month. These are by no means exactly in line with total planned deliveries shown on the line above. It is often necessary and desirable to build a product on a different schedule than that submitted by the customer in terms of delivery desired, due to wide fluctuations in the customers' schedules. We try to level these off by anticipating what is going to happen to customer requirements and building ahead on a somewhat even keel to reduce the effect of radical changes in volume in the shop as much as possible. Another point to consider is the fact that the customer may want the entire month's schedule shipped the first part of the month indicated. It is for these reasons that this "internal production plan" is maintained and on it are based our material requirements and the shop schedules.

*Finding Material Requirements*

The next step is to convert production thus scheduled into material requirements. When determined, these are presented to the purchasing department monthly in the form of a so-called "buy." For some time we have been using the facilities of the tabulating department to list quantities and kinds of material, showing the months in which it will be used.

The forecast cards tell us the products to be made. We obtain an engineering parts list from the product engineering department

which tells what the product consists of, by part number, and the quantities of each part that go into the assembly. However, we cannot set up our records from this form alone, since we do not know whether we are to buy the part complete or buy the raw material and make the part in our plants. Our source of information as to decisions already worked out on this point is the material assignment which is prepared by the process engineering department. Using the engineering parts list and the material assignments, we work up a production control department parts list. This work sheet, when finished, shows what material we actually have to buy for each product.

The completed work sheet is presented to the tabulating department where a card is punched for each part shown and a production control department parts list run and furnished us. This parts list is then compared with the original work sheet and, if correct, we know that the punched cards are ready for use in converting products scheduled to be made into related material needs. The tabulating department also furnishes us with what we call our material usage file. This file is arranged in part number order and shows all of the assemblies which use any particular purchased item. In other words, it gathers together in numerical order all assemblies and subassemblies, sold as production or service, which use the same purchased material. This file, which permits us to work from material to product just as the production control parts list provides for check from product to material, is used constantly in checking and reviewing orders or in checking material requirements on order against actual requirements.

### *Preparing A "Buy"*

We have now finished the preliminary steps required to put us in position to make a listing of all material required for the items we are to manufacture. This may be compared to a shop operation in setting up a particular job. In order to actually prepare a material "buy," which is the material listing presented by production control to the purchasing department, the tabulating department must have information in addition to that already described in connection with the preparation of the production control department parts list. Without going into the particulars of application in the tabulating department, it may be said that this information adjusts quantities needed by the internal production plan,

to take account of certain special factors. These are listed as follows, together with the spread sheet which is basic to the "buy."

1. *The last annual inventory.* All our records date from this inventory. New forecast cards are prepared at this time and only the unshipped balances of orders are considered after inventory. It is not necessary to go into detail as to how we process an inventory for use in the material "buy," except to state that all material is translated back from a finished or semifinished state to a raw material state and such inventory remains a *constant credit,* which reduces all future requirements for the related materials showing balances needed.

2. *Factory Scrap.* Factory scrap tickets are presented to us by the inspection department about the twenty-eighth of each month. We go through all these tickets, disregarding assemblies because the inspection department has already made scrap tickets (resulting in orders) for all the defective parts in assemblies. This material is translated back to the stage in which we buy it and becomes an *additional requirement* in the material "buy."

3. *Material Floats.* If a customer wants 20,000 of a particular product in the month of October, it will be necessary for us to ship about 1,000 each day. Obviously, if we are to ship 1,000 units on the first working day, it is necessary for us to build some of the parts of that product in the previous month. This overlap is designated as a "float." The floats are determined by the plant managers, superintendents, and the production manager and become a part of the shop schedule and the material "buy." These floats, representing products which must be made in one month for the next month's delivery, become *permanent requirements* on an estimated basis and are used in each material "buy."

4. *Spread Sheet.* A spread sheet is merely the listing of the part number, quantity of the saleable item to be produced per month and total quantity of the saleable item to be produced between time of the last annual inventory and the date in question, as taken from the internal production planning line on the forecast card.

The information required under the foregoing headings is presented to the tabulating department about the fifteenth of each month and permits it to compute and print a material "buy," which is presented directly to the purchasing department and is its schedule and authorization for actually issuing purchase orders to our vendors. The total shown, which is also broken down by months, is the total requirement under the "internal production plan" from the time of inventory through the last month indicated on the "buy," normally five months in advance, with adjustments made for customer schedule revisions, inventory, scrap, and float. Actual purchases already made for the months which have passed since inventory will show on the purchasing department records. Obviously one "buy" a month is not frequent enough to enable us to operate smoothly under all circumstances, and therefore, we supplement the monthly "buy" by the use of a Material Delivery Inquiry, a special form used to order material for rush or urgent orders, to be acted upon between "buys."

We must be constantly on the alert for engineering changes which will affect the material to be purchased. We receive from the engineering department copies of all engineering changes applicable to products, and we adjust our records on those which affect material. All changes must be processed so that they are reflected on our material usage file, production control department parts list, and tabulating department records so that future "buys" will reflect all changes correctly.

*Watching Current Shipments and Current Production*

On the back of the forecast card are posted shipments on the various individual orders noted on the front of the card. At the end of each month the total shipments are posted in a column on the front of the card marked "Shipped Since Inventory," opposite each of the customers listed. The shipments scheduled in the monthly columns are then reduced by the actual shipments of the previous month and the resulting figure (the difference between the scheduled and actual shipment figures) will show whether there are deliveries past due for the month, or whether we are "even with the board," or have shipped into the following month's requirements. In this way, cards are kept current to reflect at all times the balances to be shipped to each customer.

It will have been noted that the volume of our production, though related to orders, is based more directly on the "internal

production plan" line on the product forecast card. This means that we can and do produce ahead of actual release orders by customers. The objective is to have operations, including material purchasing, somewhat beyond requirements. In this we keep an eye on trends. The only time we could get into serious trouble on this point is when a particular model is to be out of production. We usually have advance notice of this from the sales department trend forecast. Any advance information of this kind must be passed on, also, to the plant managers, master mechanics, superintendents, and tool supervisors so that steps can be taken to watch the schedule closely on these items, as well as the purchasing of new tools or fixtures which may be usable only for the job that is going out of production. The trend forecast mentioned is reviewed by the master mechanic and tool supervisors for:

1. Radical fluctuations which appear likely in future months.
2. The effect on our building schedule.

Radical changes in schedule or discontinuance of a model will have a definite effect on the ordering of tools and fixtures, with which these individuals are vitally concerned.

*Handling Cancellations*

Another matter of importance in regard to control of material requirements is the handling of cancellations. The customer requests cancellation by use of a special form, wire, or letter. We receive this information in the production control department where we decide what action to take on the request. In most instances, we are able to grant it without charge, inasmuch as the product has not been manufactured and the material is common to other products. In this case we merely correct our forecast card and, if service parts are affected, notify the warehouse so that they can change their copy of the sales order. We also make the necessary notations on our copy of the sales order. We then indicate on the request that the cancellation can be accepted with no charge as far as material is concerned and send it to the sales department for acknowledgment to the customer.

Now and then we receive a request for cancellation in cases in which the material has already been produced or is in process. In such a case, if the customer persists in his desire to cancel, it is necessary to set up a formal cancellation, prepared by the sales department with two copies to us. We indicate on both copies

what material must be cancelled at once from vendors and any outside commitments charged to the company requesting cancellation. One copy of this form is submitted to the purchasing department, which must see that all outside commitments are handled properly. The other copy is retained in our file.

It is necessary for us to cease work on this particular product at once, gather together finished, in process, or raw material which we will have to charge the customer for, and have it placed in a special room for cancelled material. This is done by telephone so that operations can be brought to a halt quickly. A shop schedule revision and a decision as to what is to be done with specific materials follows. It is then the duty of the material section to advise the accounting department by letter of the materials, whether raw, in process, or finished, for which the customer is to be billed.

*Conclusion*

It will be appreciated, on the whole picture of the procedure described, that all information called for must be made available to the production control department promptly. Only with the complete cooperation of all sections of supervision and the production departments can the production control department accomplish the extensive task set. However, if this prerequisite is met, the system affords a production planning and control system at once centralized and flexible.

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**COMING ARTICLES**

In the *N. A. C. A. Bulletin,* September 15, 1948

**A Look at Profit Sharing—Purposes and Methods**
by J. J. Bigge

**Objectives and Fundamentals of Wage Incentive Plans**
by Joseph V. Miccio

**Operating and Procedural Advantages of Departmental Group Incentives**
by Jerome Johannes

**Piece Count Control Under Wage Incentive Plans**
by L. M. Henderson

**A Simple Operating Procedure for a Time Study Staff**
by Frank K. Billett

# STANDARD DIRECT LABOR COSTS FOR AUTOMATIC ELECTROPLATING PROCESSES

by CLARENCE W. REINERT,
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MOST of us are familiar with numerous items in everyday use in our own household or on our automobiles which have attractive as well as durable coatings of chromium, nickel, cadmium, silver, etc. The process of applying any of those coatings is known as electroplating. In general the item to be electroplated must pass through a series of tanks containing cleaners, rinses, and a plating solution provided with anodes and electric current. Each tank has its own particular function to perform and, for maximum efficiency, temperature ranges, chemical requirements, and current must be properly controlled at all times. Each type of plating has its own particular requirements as prescribed by the science of electrochemistry.

*Use of Racks—Manual and Automatic*

Items to be plated must be first fastened to racks for suspension in the various solutions. When these racks must be carried by hand from one tank to another in accordance with the required sequence, the plating equipment is known as being manually operated. Modern equipment is provided with mechanical arrangements to carry the racks through the process automatically, the only manual requirements being to load the racks for plating and unloading them when finished.

Our company has been engaged in the manufacture of plumbers brass goods for over fifty years, with a line composed principally of items such as bent tube traps, bath and sink wastes, lavatory supplies, etc. The necessary tanks and loading stations consist of an endless chain in the shape of an oval. An overhead conveyor, which is controlled by an automatic time switch, picks all racks from the tanks as well as from the loading station simultaneously and conveys them to the following tank at definite intervals. By the time a rack has completed its cycle through all tanks and has returned to its starting position, the items attached to it have been given a triple plate consisting of copper, nickel, and chrome. All solutions in the various tanks are kept within definite temperature ranges by means of electrically controlled valves.

*Developing Standard Labor Cost Per Rack*

Aggregate plating labor is rather easy to identify. For example, we have found that to operate this equipment at maximum capacity requires two employees for filling the racks at a racking bench and placing them, two at a time, in the loading station and a third employee to remove the plated items as they complete the cycle. However, in the development of our standard cost system, it has been necessary for us to determine the direct labor cost for each item passing through this plating process. Here, too, the initial steps are straightforward. Since a rack containing the items to be processed must pass through a definite number of tanks in accordance with an established cycle, we can easily determine how many racks can be done in a definite work period.

To use specific figures, let us assume that with 23 tanks in the process, each performing its respective part on two racks containing parts, there will be 46 racks in process at all times at 100 per cent operating efficiency. Let us further assume that the complete cycle requires 30 minutes. Then after the first complete loading, 46 racks will be processed in each 30-minute interval. In setting our standards, we have used 8½ hours as a normal work day, split up into two work periods of 5 hours for the morning and 3½ hours for the afternoon. To obtain the total number of racks which should be plated during the day at 100 per cent efficiency, we apply a formula, allowing half an hour at the start of each period for the time during which the racks are being loaded. On the data given, the formula would work out as follows for each period:

For morning period

$$\frac{(5 \text{ hrs.} \times 60 \text{ min.}) - 30 \text{ minutes}}{30 \text{ minutes}} \times 46 = 414 \text{ racks}$$

For afternoon period

$$\frac{(3\frac{1}{2} \text{ hrs.} \times 60 \text{ min.}) - 30 \text{ minutes}}{30 \text{ minutes}} \times 46 = 276 \text{ racks}$$

| | |
|---|---|
| Total racks for normal work day at 100 per cent efficiency | 690 racks |

In order to make allowance for minor delays, the occasional occurrence of partly filled racks, and failures in keeping the maximum number of racks in process at all times, we have set our normal work day at 80 per cent or, on the above figures, 552 racks

in 8½ hours. Over a period of six months' observation we have found this percentage very much in line. If our payroll at standard rates for the above period for the three employees mentioned earlier is $24.84, we have a standard labor cost of $.045 per rack.

*Computing Standard Labor Cost Per Piece*

To go beyond the point of cost per rack is more difficult. During the course of a work period, a variety of items will be passing through the process and, at any time, there may be as many as eight or ten of different shapes and sizes. If they were mixed on a rack, the piece cost would be hard to trace. To accommodate this situation and for other reasons of efficient processing, plating engineers have designed for us a variety of racks, each applicable to certain specified items and, by making up a master sheet showing the items and the respective quantities to be placed in process on a single rack, we can easily determine the labor cost on any specific part by merely dividing $.045 by the quantity plated on the rack. Since our standard costs are all set up on the basis of 100 units, we have arranged the master sheet on that basis.

At the end of each day, the plating department turns in a simple report showing date, production order number, name of item, number of pieces on a rack, number of racks, and the final number of pieces plated for each respective item for that day. A space is also provided for the names and hours of each employee.

*Determining Efficiency and Exercising Control*

A member of the cost department examines the report and observes whether the specified rack has been used in accordance with the master sheet and, at the same time, applies the standard labor costs per rack to the quantity totals of each item plated. By totaling the final results on all items, we arrive at the standard labor value produced for the day. The hourly rates are then applied to each employee's hours, thus arriving at the actual direct labor cost. The value of the standard labor produced divided by the actual direct labor cost gives us the rate of efficiency in production for the day. The difference between the standard and actual labor is the amount of the favorable or unfavorable variance.

This method of establishing direct labor costs and maintaining a production comparison with standards has proven very satisfactory, not only from the standpoint of up-to-date cost information but also in controlling costs by maintaining an even flow of production.